# PRELIMINARY DESCRIPTIVE MODEL OF LACUSTRINE HALITE

## BRIEF DESCRIPTION

**Deposit synonyms:**

**Principal commodities produced:** Sodium chloride (halite, salt).

**By-products:** See associated deposit types.

**End uses:** Chemicals, food industry, snow and ice removal.

**Descriptive/genetic synopsis:** Massive and bedded deposits of halite formed in continental basins. The deposits may be of large areal extent and hundreds of meters thick, but are, on average, smaller than marine halite deposits.

**Typical deposits:** Salar de Uyuni, BLVA
Luke Salt, USAZ
Piceance Basin, USCO

**Relative importance of the deposit type:** Important locally where marine halite deposits are not found; for example, Australia.

**Associated/related deposit types:** Other continental evaporites and lacustrine deposits, including brines, lacustrine gypsum, clay, zeolites.

## REGIONAL GEOLOGIC ATTRIBUTES

**Tectonostratigraphic setting:** Convergent plate boundaries, extensional terranes, other settings conducive to basin formation.

**Regional depositional environment:** Closed or semi-closed basins, typically structural basins.

**Age range:** Late Tertiary to Recent, but in rare cases may be as old as Paleozoic.

## LOCAL GEOLOGIC ATTRIBUTES

**Host rock(s):** Lacustrine sediments and evaporites.

**Associated rock(s):** Gypsum, potash, anhydrite.

**Ore mineralogy:** Halite.

**Gangue mineralogy:** Calcite, gypsum, clay, anhydrite.

**Alteration:** Ground and surface water dissolution can modify the layering, porosity, or grain size of a deposit or destroy it altogether.

**Structural setting:** Basins, commonly fault-controlled.

**Ore control(s):**

-- Closed or semi-closed basin
-- Source of sodium and chloride within basin;
-- Arid climate;
-- Basin brine concentrated through evaporation to a salinity high enough to precipitate halite.

**Typical ore dimensions:** Highly variable. Horizontal dimensions of known deposits range from tens of meters to greater than 5 kilometers. Thickness can vary from less than 1 m to over 2000 m.

**Typical alteration/other halo dimensions:** N/A

**Effect of weathering:** Surface weathering, except in extremely arid climates, destroys salt deposits.

**Effect of diagenesis/metamorphism:** Plastic flow of salt is enhanced with burial, doming of salt may occur in thick sequences of evaporites. With increasing metamorphism, the deposit is destroyed.

**Maximum limitation of overburden:** Can be mined by conventional methods to a depth exceeding 100 m. May be solution-mined at depths greater than 500 m.

**Geochemical signature(s):** None distinctive.. Lacustrine halite deposits commonly have less Br and I than marine deposits.

**Geophysical signature(s):** Halite gives low response on gamma-ray well logs. Large bodies of halite form relative gravity lows.

**Other exploration guide(s):** Groundwater may have elevated salinity.

**Most readily ascertainable regional attribute:** Existence of closed basin in arid environment.

**Most readily ascertainable local attribute:** Efflorescences of saline minerals; saline springs or wells; known gypsum or other evaporite outcrops.

## ECONOMIC LIMITATIONS

**Physical/chemical properties affecting end use:** Impurities must be low.

**Compositional/mechanical processing restrictions:**

**Distance limitations to transportation, processing, end use:** Transportation represents the major cost of this commodity.

## SELECTED REFERENCES


Blatt, Harvey, Middleton, Gerard, and Murray, Raymond, 1972, Origin of sedimentary rocks: Englewood Cliffs, New Jersey, Prentice-Hall Inc., 634 p.

Eaton, G.P., Peterson, D.L., and Schumann, H.H., 1972, Geophysical, geohydrological, and geochemical reconnaissance of the Luke Salt Body, Central Arizona: U.S. Geological Survey Professional Paper 753, 28 p.

Harben, P.W., and Bates, R.L., Salt, *in* Industrial minerals geology and world deposits: London, Industrial Minerals Division of Metal Bulletin Plc, p. 229-234.

Raup, O.B., 1991, Descriptive model of bedded salt; Deposit subtype: Marine evaporite salt (Model 35ac), *in* Orris, G.J., and Bliss, J.D., 1991, Some industrial mineral deposit models: descriptive deposit models: U.S. Geological Survey Open-File Report, p. 29-30.

Smith, G.I., 1966, Geology of Searles Lake--a guide to prospecting for buried continental salines, *in* Rau, J.L., eds., Second Symposium on Salt, volume 1: Cleveland, Ohio, The Northern Ohio Geological Society Inc., p. 167-180.